Remittances, financing constraints and growth volatility : Do remittances dampen or magnify shocks ?

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Remittances, Financing Constraints and Growth Volatility : Do Remittances dampen or magnify Shocks?*

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Abstract: This paper studies empirically the link between remittances and growth volatility by examining the impact of remittances on the propagation of real and monetary shocks. This study is conducted by employing dynamic panel generalized method of moment (GMM) technique for a sample of 63 countries over the 1980-2004 period. The volatility of terms of trade and inflation is used to proxy for real and monetary volatility, respectively. The results show that the impact of remittances on the propagation of shocks depends on the nature of shock. Precisely, the results show that remittances dampen the effect of terms of trade volatility, but, magnify the effect of inflation volatility. The results also suggest that the dampening effect of remittances on propagation of terms of trade volatility is greater in country with high level of financial development.

Résumé: Ce papier étudie empiriquement l'effet des transferts des émigrés sur la volatilité économiques des pays en développement, en examinant l'impact de ces transferts sur la propagation des chocs réels et monétaires. Cette étude est mise en oeuvre en utilisant la Méthode des Moments Généralisés en panel dynamique sur un échantillon de 63 pays couvrant la période 1980-2004. La volatilité des termes d'échange et celle de l'inflation sont utilisées pour représenter, respectivement, la volatilité des chocs réels et celle des chocs monétaires. Les résultats montrent que les transferts des émigrés atténuent l'effet de la volatilité des termes d'échange, mais amplifient l'effet de la volatilité de l'inflation. Les résultats montrent aussi que l'effet d'atténuation des transferts des émigrés sur la propagation des chocs de termes d'échange est très élevée dans les pays avec un niveau très élevé de développement financier

JEL classifications: F22, F24, O11

Keywords: Remittances, Financing constraints, Volatility

1 Introduction

Remittances, funds received from migrants working abroad, to developing countries have increased vastly in recent years. These funds have become the second largest source of external finance for developing countries after foreign direct investment (FDI) (see figures 1 and 2). For many developing countries, remittances are important sources of income (figure 3). Remittances are unlike all others capital flows because they tend to be stable and to move countercyclically relative to the recipient country's economy (see Yang, 2006).

The increase in remittances inflows to developing countries has induced a growing number of studies to analyze the development impact of remittances along various dimensions, including: poverty, inequality, growth, financial development, entrepreneurship, education and infant mortalities. However, none of the previous studies have related remittances to macroeconomic volatility. This paper tries to shed light on the link between remittances and macroeconomic volatility in developing countries, by identifying the channels through which remittances potentially affect growth volatility. Specially, this paper examines whether, remittances serve as shock absorbers mitigating the effect of real and monetary volatility on growth volatility. Remittances can be related to volatility through two channels. The first channel is the link between financing constraints (or financial development) and volatility (high level of financial development corresponding to low financing constraints). The second channel is the link between remittances and financing constraints (or financial development).

Several researchers have provided some evidence on the relationship between financial development (financing constraints) and volatility of growth (e.g Bernanke and Gertler (1989), Easterly, et al. (2000), Denizer, et al. (2002), Raddartz (2006), and Beck, et al. (2006)). Almost all the empirical studies show that economies with fully developed financial sectors (or low financing constraints) experience low volatility of growth. In particular, Beck et al. (2006)[1] study whether financial development by reducing credit market imperfections dampen or magnify the shocks effects on growth volatility. They show that financial development (i) dampen the effect of real volatility, but (ii) magnify the effect of monetary volatility in countries where firms have little or no access to external finance through capital markets. This paper continues in the sense of Beck et al. (2006) and examines whether remittances dampen or magnify the shocks effects by relaxing directly individual financing constraints or by promoting financial development.

1. Using a panel of 63 countries over the period 1960-1997 and using the volatility of terms of trade and inflation to proxy for the real and monetary volatility, respectively, Beck et al., (2006) find (i) weak evidence that financial intermediaries dampen the effect of terms of trade volatility, and (ii) some evidence that financial intermediaries magnify the impact of inflation volatility in countries where firms have little or no access to external finance through capital markets.

On the one hand, remittances can reduce output volatility directly by relaxing financing constraints of remittances recipients who can not borrow on financial markets (Aggarwal et al. (2006)). In this case remittances become a substitute for inefficient or nonexistent credit markets, then as financial development remittances reduce output volatility.

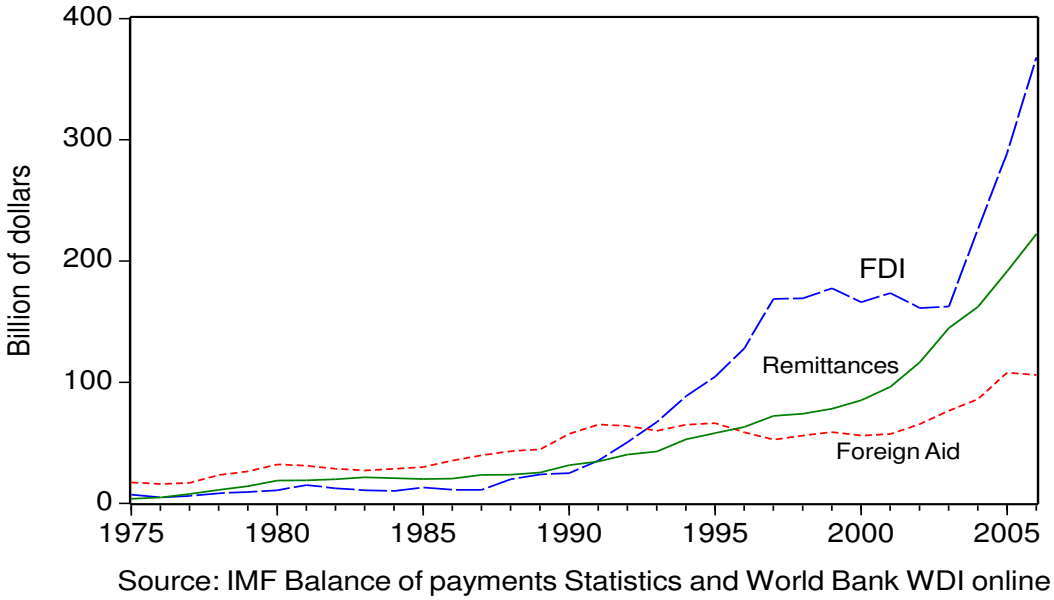

Figure 1. Remittances Capital Inflows in Developing Countries (in US Dollar Billions)

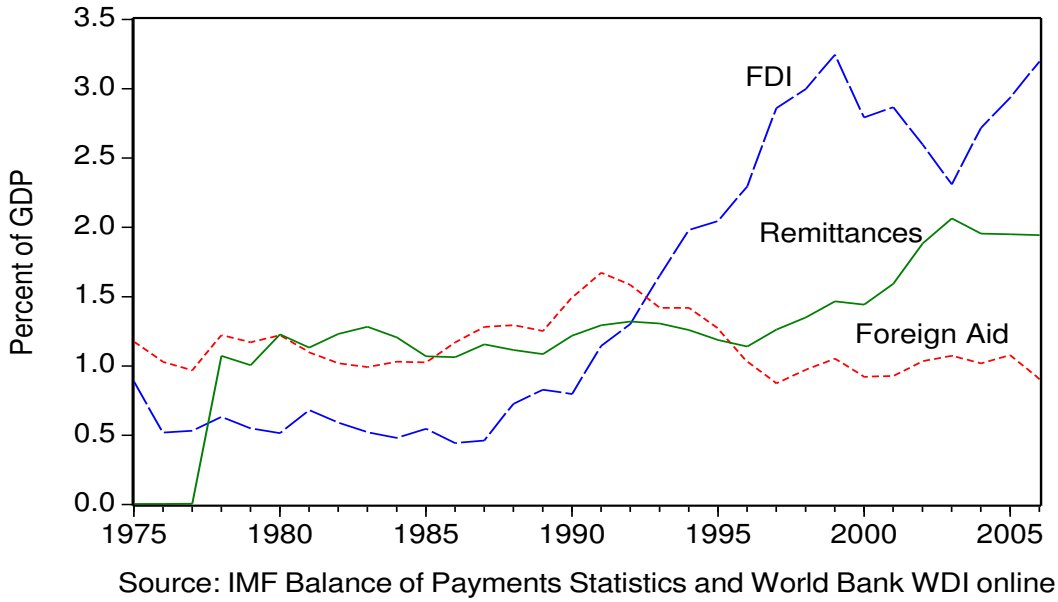

Figure 2. Remittances Capital Inflows in Developing Countries (in percent of GDP)

On the other hand, remittances can reduce indirectly output volatility by promoting domestic financial development. Aggarwal et al. (2006)[2] show that remittances promote financial development by increasing the aggregate level of deposits and credit intermediated by the local banking sector. The idea is based on the fact that money transferred through financial institutions paves the way for remittances recipients to access to other financial products and services, which they might not have otherwise (Orozco and Ferewa, 2005, and, Aggarwal and Demirgüç-Kunt (2006)). In fact, by providing remittances transfer services banks get to know remittances recipients. Then, remittances might have a positive impact on credit market development if banks become more willing to extend credits to remittances recipients because the transfers they receive from abroad are perceived to be significant and stable. However, it is possible that banks lending to remittances recipients does not materialize, because remittances recipients do not need banks lending. But, in this case overall credit in the economy might increase if banks' loanable funds surge as a result of deposits linked to remittance flows. As a result, remittances might affect volatility by extending banks credits to remittances recipients or by increasing banks' loanable funds.

This paper examines empirically whether remittances affect the impacts of real and monetary shocks volatility on growth volatility. As in Beck et al. (2006), the volatility of terms of trade and inflation is used to proxy for the extent to which an economy is exposed to real and monetary shocks, respectively. This study is conducted by employing the recently developed dynamic panel generalized method of moments (GMM) technique, which not only can effectively cope with the endogeneity problem, but allows us to control for country-specific effects and to incorporate all available information in the cross section as well as the time series dimension. The sample covers 63 countries over the 1980-2004 period. In order to produce the panel data, the annual data on each country are divided into the five sub-periods, each one of which includes the data points for five years. The use of 5-year interval allows for variation over time, and also allows us to have five observations for each country when available. The study finds that the impact of remittances on the propagation of shocks depends on the kind of shock (real or monetary shock). Precisely, the results show that remittances dampen the effect of terms of trade volatility, but, magnify the effect of inflation volatility. The empirical results also suggest that the dampening effect of remittances on propagation of terms of trade volatility is greater in country with high level of financial development.

The remainder of the paper is organized as follows. Section 2 presents the empirical methodology pursued to study the impact of remittances on volatility. Section 3 describes the data used in the empirical estimation. Section 4 presents the empirical results and Section 5 concludes.

2. Aggarwal et al. (2006) uses data on workers' remittances flows to 99 developing countries during 1975-2003 to study the impact on financial sector development. In particular, they examine whether remittances contribute to increasing the aggregate level of deposits and credit intermediated by local banking sector.

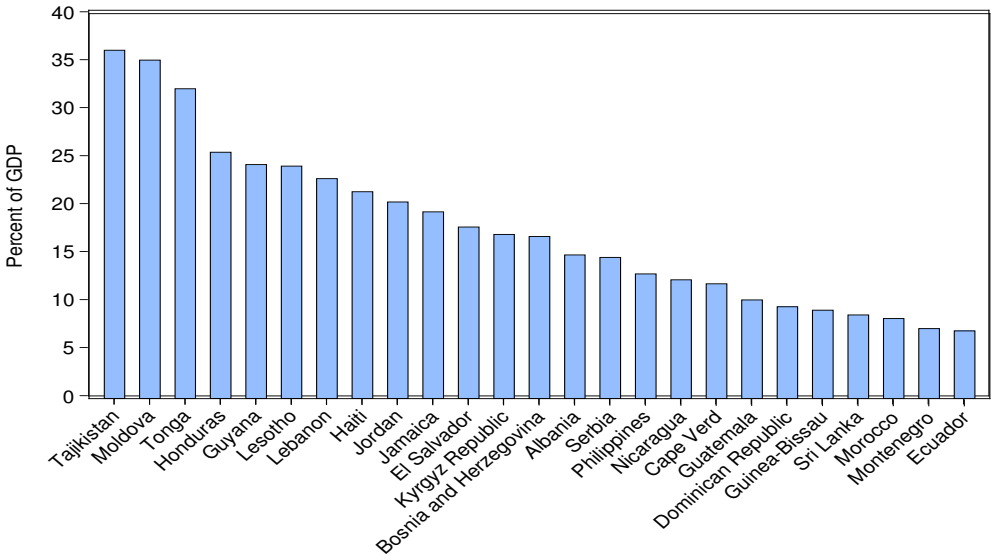

Figure 3. Top remittances-recipient countries in 2006 (in percent of GDP)

2 Estimation Method

The paper employs a dynamic panel model that is estimated using a generalized method of moments estimator (GMM), tailored to deal with persistence in dependent variable and potential endogeneity in explanatory variables[3].

2.1 Dynamic panel GMM method

The dynamic specification is given by the following distributed lag model:

$$VGDP_{it} = \alpha VGDP_{it-1} + \beta' X_{it} + u_i + \varepsilon_{it} \quad (1)$$

where $VGDP_{it}$ measure the growth volatility in country i at time t, X_{it} is a set of explanatory variables, including the variables of interest, u_i is an unobserved country-specific fixed effect and ε_{it} is the error term.

As suggesting by Arrellano and Bond (1991), take first difference of equation (1) to eliminate the country-specific effect, we have:

$$\Delta VGDP_{it} = \alpha \Delta VGDP_{it} + \boldsymbol{\beta}' \Delta X_{it} + \Delta \varepsilon_{it} \quad (2)$$

In equation (2), the lagged difference in dependent variable is correlated with the error term, and the explanatory variables are potentially endogenous. Then, estimating equation (2) requires to use instruments. Assuming that the error term is not serially correlated and that the lagged levels of the endogenous variables are uncorrelated with future error terms, the GMM difference estimator ("difference GMM") uses the lagged levels of endogenous variables and the current level of exogenous variables as instruments.

3. For more details, see Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998).

The following moment conditions are used to calculate the difference estimator:

$$E(VGDP_{i,t-s}\Delta\varepsilon_{it}) = 0 \quad for \ s \geq 2; \quad t = 3, ..., T \tag{3}$$

$$E(X_{i,t-s}\Delta\varepsilon_{it}) = 0 \quad for \ s \geq 2; \quad t = 3, ..., T \tag{4}$$

Blundell and Bond (1998) show that, when the time period is short (as is the case in this paper), the difference estimator can be combined with an estimator in levels to increase efficiency ("system GMM"). The equation in levels uses the lagged differences of explanatory variables, provided that the error term is not serially correlated, and that the difference in the explanatory variables and the error term are not correlated. We then have the following stationarity properties:

$$E(VGDP_{i,t+p}\, u_i) = E(VGDP_{i,t+q}\, u_i) \text{ and } E(X_{i,t+p}\, u_i) = E(X_{i,t+q}\, u_i) \text{ for all } p \text{ and } q \tag{5}$$

The regression in level requires the following additional moments conditions:

$$E[\Delta VGDP_{i,t-s}(u_i + \varepsilon_{it})] = 0 \ for \ s = 1 \tag{6}$$

$$E[\Delta X_{i,t-s}(u_i + \varepsilon_{it})] = 0 \ for \ s = 1 \tag{7}$$

Arellano and Bond (1991) propose a two-step GMM estimator. In the first step the error terms are assumed to be independent and homoskedastic across countries and over time. In the second step, the residuals obtained in the first step are used to construct a consistent estimate of the variance-covariance matrix, thus relaxing the assumptions of independence and homoskedasticity. The two-step estimator is thus asymptotically more efficient than the one-step estimator. However, as shown by Arrellano and Bond (1991) and Blundell and Bond (1998), the asymptotic standard errors for the two-step estimators are biased downwards. The one-step estimator is asymptotically inefficient relative to the two-step estimator, even in the case of homoskedastic error terms. Thus, while the coefficient estimates of the two-step estimator are asymptotically more efficient, the asymptotic inference from the one-step standard errors might be more reliable. This problem is exacerbated when the number of instruments is equal to or larger than the number of cross-sectional units. To compensate, Windmeijer's finite-sample correction is used for the two-step covariance matrix. This can make two-step robust more efficient than one-step robust, especially for system GMM. However, as commonly in the literature, for robustness analysis the results for both the one-step and the two-step estimations are presented.

Since the validity of instruments determines whether the GMM estimator is consistent or not, two specification tests are implemented. These tests are Hansen test of over-identifying restrictions and Arrellano and Bond's (1991) test for second-order serial correlation in the error term. The Hansen test of overidentifying restrictions has a null hypothesis that the instruments are overall valid. The Arellano and Bond's (1991) test for second-order serial correlation has a null hypothesis that there is no second-order serial correlation in the differenced error term (the residual of the equation in differences). It should be noted that first-order correlation is expected in the differenced equation even if the error term is uncorrelated (unless it follows a random walk). In contrast, the presence of

second-order correlation indicates serial correlation of the error term and that it follows a moving average process of at least order one.

2.2 Empirical model

The empirical model estimated by the system GMM described above is the following[4]:

$$\begin{aligned} VGDP_{it} = {} & \alpha VGDP_{it-1} + \beta_1 VTOT_{it} + \beta_2 VINF_{it} + \gamma FD + \lambda Rem_{it} \\ & + \gamma_1 (FD * VTOT)_{it} + \gamma_2 (FD * VINF)_{it} + \lambda_1 (Rem * VTOT)_{it} + \lambda_2 (Rem * VINF)_{it} \\ & + \mathbf{\Psi}' CV_{it} + u_i + \varepsilon_{it} \end{aligned} \tag{8}$$

where $VGDP$ denotes the volatility of real GDP per capita growth, Rem is equal to remittances over GDP, $VINF$ is the volatility of inflation, $VTOT$ is the volatility of terms of trade, CV is the matrix of control variables, u_i is an unobserved country-specific fixed effect and ε_{it} is the error term.

As in Beck and al. (2006), I use the volatility of terms of trade changes ($VTOT$) and inflation ($VINF$) to proxy for the extend to which an economy is subject to real and monetary shocks and thus its volatility, respectively[5]. Then, the interaction terms ($FD * VTOT$) and ($FD * VINF$) (resp. ($Rem * VTOT$) and ($Rem * VINF$)) are used to explore the impact of financial development (remittances) on the propagation of real and monetary shocks. In fact, the theoretical models show that financial development change the shock effects on growth volatility (see for example Beck et al. (2006)). As discussed in the introduction, remittances can have the same property as financial development.

The control variables matrix CV includes real GDP per capita, index of openness ($OPENNESS$), and the interactions of openness with terms of trade changes and inflation volatility. There is considerable evidence that wealthy countries are more stable (Easterly et al. (2000)). Greater openness, on the other hand, increases a country's exposure to changes in external shocks and can impact the effect of domestic monetary shock (Beck et al. (2006)).

3 Data

I use a sample of 63 developing countries with data for the period 1980-2004. All the data are collected from the dataset of WDI (World Development Indicators) or IFS (International Financial Statistics).

In order to produce the panel data, I assemble the annual data from 1980 to 2004 and divide them into the five sub-periods each one of which includes the data points for five years. The use of 5-year interval allows for variation over

4. In this paper the system GMM estimation is implemented using the xtabond2 procedure available on STATA Software.

5. Beck and al. (2006) showed that financial development dampen the effect of terms of trade volatility, but magnify the effect of inflation volatility in countries where firms have little or no access to external finance through capital markets.

time, and also allows to have five observations for each country when available. As in Acemoglu et al. (2003) and in Yang (2008), volatility of growth is measured by the standard deviation of real GDP per capita growth rate over a 5-year interval. Similarly to the volatility of growth, the volatility of terms of trade changes ($VTOT$) and inflation ($VINF$) are measured by the standard deviation of each variable for each sub-period. Where terms of trade change is the annual change in the log of ratio of import and export price index, and inflation is the annual change in the log of CPI (Consumer Price Index).

All others are averaged over 5-year interval. The variable of interest, Remittances (Rem), is measured by the level of remittances as share of GDP. The index of financial development (FD) is proxied by private credit, the claims on the private sector by financial intermediaries as share of GDP. As argued in Beck and al. (2006), private credit measures the most important activity of the financial intermediary sector, channeling funds from savers to investors, and more specifically, to investors in the private sector. The degree of openness ($OPENNESS$) is measured by the trade openness i.e sum of export and import as share of GDP. This variable is the most commonly used to proxy the degree of openness (some recent papers: Beck et Levine (2004), Beck et al. (2006), Yang (2008)) .

4 Empirical results

This section presents the regression results. First, I discuss results from regression without interaction terms (Table 1). Secondly, I present the regression results with interaction terms: interaction of remittances, financial development and openness with shocks volatility (terms of trade and inflation volatility) (Table 2). As mentioned above, the use of the interaction terms of remittances, financial development and openness with shocks volatility is appropriate to explore the impact of these variables on the propagation of shocks. Finally, I present the results with interaction terms at different levels of financial development (Table 3). This last regression allows to examine whether the dampening or the magnifying effect of remittances on propagation of shocks volatility depend on the level of financial depth. In all cases, for robustness analysis, the results of both one-step and two-step system GMM estimator are presented.

Regressions without interaction terms

The regressions results without interaction terms (Table 1) suggest a significant impact of terms of trade volatility on growth volatility, while no significant impact of GDP, inflation volatility, remittances, financial development and openness. The volatility of terms of trade changes enters positively at the 10% level in both the one-step and the two-step regressions. As argued above, the fact that remittances, financial development and openness are not significant underlines the importance to use their interactions with volatility of terms of trade changes and inflation. Moreover, the non-significance of inflation volatility can be due to the fact the propagation of monetary volatility on growth depends on the level of

financial development, openness or remittances. This also highlight the importance to use the interactions terms.

Regressions with interactions terms

As in the regressions without interactions terms, GDP is not significant. This result is line with that in Beck et al. (2006).

Financial development enters negatively at the level 5% in the one-step regression, but is not significant in the two-step regression. The interactions of financial development with different sources of volatility enter positively at the level 10% in the one-step regression, but they are not significant in the two-step regression. This means that financial development seem to not change (or magnify weakly) the effect of terms of trade and inflation volatility. This result is in contrast with that obtained by Beck et al. (2006). They showed that financial development dampen the effect of terms of trade volatility, but magnify the effect of inflation

Table 1: Remittances and Volatility

Dependent Variable: Volatility of GDP ($VGDP$)		
	(1)	(2)
	One-step	Two-step
$VGDP(-1)$	0.200**	0.230**
	(0.023)	(0.017)
GDP	0.003	0.003
	(0.543)	(0.373)
$VTOT$	0.032*	0.030*
	(0.053)	(0.081)
$VINF$	0.006	0.006
	(0.327)	(0.257)
FD	-0.001	0.000
	(0.731)	(0.954)
$OPENNESS$	-0.001	-0.002
	(0.904)	(0.680)
Rem	0.000	0.000
	(0.968)	(0.908)
Intercept	0.005	0.002
	(0.849)	(0.952)
Number of Countries	63	63
Number of Observations	239	239
AR(1) test	(0.000)	(0.004)
AR(2) test	(0.184)	(0.237)
Hansen test	(0.790)	(0.793)

One-step and Two-step denote the one-step and the two-step GMM (in system) regression, respectively.
GDP, Rem, FD and $OPENNESS$ are taken in log.
Period dummies are not reported. Robust P-values are in parenthesis.
***, **, * denote significance at 1, 5, 10 percent level, respectively.
AR(1) test and AR(2) test are Arellano-Bond test for AR(1) and AR(2) in first differences, respectively, the null hypothesis for AR(1) test is the first-differenced regression errors show no first-order serial correlation, the null hypothesis for AR(2) test is that the first-differenced regression errors show no second serial correlation.
Hansen test is a test for overidentifying restrictions, the null hypothesis is that the instruments are valid.

volatility. However, in the model estimated by Beck et al. (2006) there is no dynamic aspect to capture the persistence in dependent variable.

Openness enters positively at the level 10% in the one-step regression, but is not significant in the two-step regression. In both the one-step and the two-step regressions, there are no significant effects of the interactions of openness with shocks. So, there is no evidence for a changing role of openness on the propagation of shocks.

The results show stronger evidence that remittances dampen the effect of terms of trade volatility, but magnify the effect of inflation volatility. The volatility of terms of trade and inflation are not significant in both the one-step and the two-step regressions. Remittances are not significant in both one-step and two-step regressions, while its interactions with terms of trade and inflation volatility enter significantly in both the one-step and the two-step regressions. Remittances interaction with terms of trade volatility enters negatively at the level 5% in the one-step regression and at the level 10% in the two-step regression. While remittances interaction with inflation volatility enters positively at the level 5% in the one-step regression and at the level 10% the two-step regressions. This result indicates a dampening (magnifying) role of remittances in the propagation of terms of trade (inflation) volatility.

Regressions with interactions terms at different level of financial depth

Table 3 presents the regression results at different level of financial development. This study reports only the results using the threshold placed at the 25th and 75th percentiles of financial development distribution[6]. So the model is estimated on two samples corresponding to the two percentiles: ''Lowest 75%" (after excluding countries with the financial development beyond the 75th percentiles) and ''Highest 75%" (after excluding countries with the financial development below the 25th percentiles). The results from these regressions show that the dampening effect of remittances on the propagation of terms of trade volatility is increasing in financial development. While the level of financial development does not change the magnifying effect of remittances on the propagation of inflation volatility.

Interaction of remittances with terms of trade volatility is not significant in the ''Lowest 75%" estimation, but it is significant in ''Highest 75%" estimation at the level 5% in both the one-step and the two-step regression. Moreover, the estimated coefficient of the interaction of remittances with terms of trade volatility is greater in the ''Highest 75%" estimation than in the estimation without threshold of financial development. This result indicates that the the dampening effect of remittances on the propagation of terms of trade volatility is greater in countries with high level financial development.

Interaction of remittances with inflation volatility enters positively in the ''Lowest 75%" estimation at the level 10% in both the one-step and the two-step regressions, and it enters positively in the ''Highest 75%" estimation at the level 1% for one-step regression and at the level 10% for two-step regression.

6. These percentiles are used so that there are many time observations by country

While the estimated coefficient of the interaction of remittances with inflation volatility is greater in "Lowest 75%" two-step regression than otherwise. So, the level of financial development does not change the magnifying effect of remittances on the propagation of inflation volatility.

Table 2: Remittances and Volatility with interaction terms

Dependent Variable: Volatility of GDP ($VGDP$)		
	(1) One-step	(2) Two-step
$VGDP(-1)$	0.193**	0.205*
	(0.028)	(0.061)
GDP	0.003	0.003
	(0.219)	(0.493)
$VTOT$	0.143	0.130
	(0.190)	(0.431)
$VINF$	0.044	0.037
	(0.253)	(0.474)
FD	-0.007**	-0.006
	(0.034)	(0.226)
$OPENNESS$	0.011*	0.011
	(0.064)	(0.295)
Rem	0.002	0.001
	(0.349)	(0.535)
$FD \times VTOT$	0.019*	0.016
	(0.058)	(0.214)
$FD \times VINF$	0.009*	0.010
	(0.098)	(0.209)
$OPENNESS \times VTOT$	-0.040	-0.035
	(0.156)	(0.410)
$OPENNESS \times VINF$	-0.014	-0.013
	(0.159)	(0.300)
$Rem \times VTOT$	-0.012**	-0.013*
	(0.038)	(0.051)
$Rem \times VINF$	0.010**	0.009*
	(0.025)	(0.061)
Intercept	-0.027	0.030
	(0.282)	(0.461)
Number of Countries	62	62
Number of Observations	233	233
AR(1) test	(0.000)	(0.007)
AR(2) test	(0.411)	(0.502)
Hansen test	(0.655)	(0.658)

One-step and Two-step denote the one-step and the two-step GMM (in system) regression, respectively.
GDP, Rem, FD and $OPENNESS$ are taken in log.
Period dummies are not reported. Robust P-values are in parenthesis.
***, **, * denote significance at 1, 5, 10 percent level, respectively.
AR(1) test and AR(2) test are Arellano-Bond test for AR(1) and AR(2) in first differences, respectively, the null hypothesis for AR(1) test is the first-differenced regression errors show no first-order serial correlation, the null hypothesis for AR(2) test is that the first-differenced regression errors show no second serial correlation.

Table 3: Remittances and Volatility: the role of financial depth

Dependent Variable: Volatility of GDP ($VGDP$)				
	Lowest 75 %		Highest 75%	
	(1a) One-step	(1b) Two-step	(2a) One-step	(2b) Two-step
$VGDP(-1)$	0.179**	0.185*	0.204**	0.223**
	(0.043)	(0.072)	(0.012)	(0.036)
GDP	0.001	0.001	0.001	0.002
	(0.673)	(0.800)	(0.487)	(0.704)
$VTOT$	0.152	0.319**	0.120	0.053
	(0.177)	(0.046)	(0.423)	(0.830)
$VINF$	0.049	0.089	-0.047	0.042
	(0.104)	(0.296)	(0.376)	(0.527)
FD	-0.006	-0.005	0.001	0.005
	(0.169)	(0.439)	(0.795)	(0.499)
$OPENNESS$	0.009	0.023*	0.009	0.004
	(0.160)	(0.090)	(0.204)	(0.774)
Rem	-0.001	-0.001	0.002	0.004
	(0.620)	(0.789)	(0.167)	(0.172)
$FD \times VTOT$	0.017	0.015	0.004	-0.020
	(0.137)	(0.354)	(0.846)	(0.542)
$FD \times VINF$	0.006	0.009	0.013	0.027
	(0.228)	(0.359)	(0.228)	(0.188)
$OPENNES \times VTOT$	-0.043	-0.083**	-0.020	0.012
	(0.130)	(0.042)	(0.618)	(0.841)
$OPENNESS \times VINF$	-0.015*	-0.026	-0.016	-0.026
	(0.075)	(0.243)	(0.236)	(0.226)
$Rem \times VTOT$	-0.005	-0.008	-0.014**	-0.020**
	(0.352)	(0.350)	(0.028)	(0.027)
$Rem \times VINF$	0.008*	0.017**	0.012***	0.012*
	(0.093)	(0.043)	(0.007)	(0.059)
Intercept	-0.006	-0.064	-0.041*	-0.033
	(0.818)	(0.348)	(0.151)	(0.611)
Number of Countries	51	51	54	54
Number of Observations	171	171	168	168
AR(1) test	(0.006)	(0.023)	(0.002)	(0.010)
AR(2) test	(0.809)	(0.647)	(0.161)	(0.258)
Hansen test	(0.865)	(0.855)	(0.871)	(0.864)

One-step and Two-step denote the one-step and the two-step GMM (in system) regression, respectively.

GDP, Rem, FD and $OPENNESS$ are taken in log.

Period dummies are included in the estimation but are not reported. Robust P-values are in parenthesis.

***, **, * denote significance at 1, 5, 10 percent level, respectively.

AR(1) test and AR(2) test are Arellano-Bond test for AR(1) and AR(2) in first differences, respectively, the null hypothesis for AR(1) test is the first-differenced regression errors show no first-order serial correlation, the null hypothesis for AR(2) test is that the first-differenced regression errors show no second serial correlation.

Hansen test is a test for overidentifying restrictions, the null hypothesis is that the instruments are valid.

5 Conclusion

It has been argued that financial development by relaxing financing constraints changes the shock effect on growth volatility. Do remittances, by relaxing financing constraints of remittances-recipient or by promoting financial development, dampen or magnify the shock effect on growth volatility ? This paper answers to this question by examining the dampening or magnifying effect of remittances on the propagation of real and monetary shocks. This study is conducted by employing dynamic panel generalized method of moment (GMM) technique for a sample of 63 countries over the 1980-2004 period. The volatility of terms of trade and inflation is used to proxy for real and monetary volatility, respectively. The results show that the impact of remittances on the propagation of shocks depend on the nature of shock. Precisely, the results show that remittances dampen the effect of terms of trade volatility, but, magnify the effect of inflation volatility. The results also suggest some evidence that the dampening effect of remittances on propagation of terms of trade volatility is greater in country with high level of financial development.

The findings of this paper show that remittances must be considered when we examine the macroeconomic volatility of remittances-recipient countries. Since volatility affect negatively growth, this paper show another channel through which remittances affect growth.

Appendix

Table A1: Countries included in sample

Algeria	Lesotho
Argentina	Malawi
Barbados	Malaysia
Belize	Mali
Benin	Mauritania
Bolivia	Mauritius
Botswana	Mexico
Brazil	Morocco
Burkina Faso	Mozambique
Cameroon	Nepal
Cape Verde	Nicaragua
Chile	Niger
China	Nigeria
Colombia	Pakistan
Costa Rica	Paraguay
Cote d'Ivoire	Peru
Dominican Republic	Philippines
Ecuador	Senegal
Egypt, Arab Rep.	Seychelles
El Salvador	South Africa
Gambia, The	Sri Lanka
Ghana, The	St. Kitts and Nevis
Guatemala	St. Lucia
Guyana	Sudan
Haiti	Swaziland
Honduras	Syrian Arab Republic
India	Togo
Indonesia	Trinidad and Tobago
Iran, Islamic Rep.	Tunisia
Jamaica	Turkey
Jordan	Venezuela
Kenya	

Table A2: Definition and sources of data

Variable	Definition	Source
GDP	Real GDP per capita	World Bank Word Development (WDI)
Volatility of GDP	Within-period standard deviation of annual change in ln(real GDP per capita)	
Private Credit	Claims on the private sector by financial intermediaries as share of GDP	WDI
Remittances	Sum of worker's remittances, migrant transfers and compensation of employees	WDI
Volatility of TOT	Within-period standard deviation of the annual change in the ln(ratio of import and export price index)	WDI, IFS
Volatility of Inflation	Within-period standard deviation of the December-to-December change in the ln(consumer price index)	WDI
Openness	Sum of exports and imports as share of GDP	WDI

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